9.1 FUEL STORAGE AND HANDLING

9.1.1 NEW FUEL STORAGE

9.1.1.1 Design Bases

The new fuel pool is designed for the storage of both new and spent fuel. Consequently, it is designed for both wet and dry storage. The maximum storage capacity of this pool is 480 PWR fuel assemblies, which is more than 3 cores. The fuel is stored in 6x10 PWR rack modules, which are designed for underwater removal and installation. The new fuel storage racks are of identical design to the spent fuel storage racks and can be used both wet and dry.

In the event additional space is needed for the storage of spent fuel from other nuclear plants in the CP&L system, the new fuel pool is designed for the storage of both PWR and BWR fuel. Spent BWR fuel will be stored in 11x11 BWR rack modules which are designed for underwater removal and installation.

The fuel racks consist of individual vertical cells fastened together through top and bottom supporting grid structures to form integral modules. A neutron absorbing material is encapsulated into the stainless steel walls of each storage cell. The PWR rack modules have a center-to-center spacing of 10.5 inches between cells. The BWR rack modules have a center-to-center spacing of 6.25 inches between cells. These free-standing, self-supporting modules are sufficient to maintain a subcritical array even in the event the fuel pool is flooded with unborated water. Table 9.1.2-1 shows the parameters for the SHNPP spent fuel racks, which may also be used to store new fuel.

The actual number and type of assemblies, the number, type and arrangement of storage modules may vary based on fuel storage needs provided structural analysis shows the proposed module arrangement to be acceptable.

The new fuel inspection pit may be used for storage of new fuel during and after receipt inspection. This facility provides only dry storage conditions.

9.1.1.2 Facilities Description

The new fuel storage pool is located in the south end of the Fuel Handling Building as shown on Figures 1.2.2-55 through 1.2.2-59.

The new fuel pool is interconnected with the three spent fuel pools by means of a transfer canal which runs the length of the Fuel Handling Building. These pools are normally isolated by means of removable gates.

The new fuel pool is a concrete structure with a stainless steel liner for compatibility with the pool water. There is no built-in drain connection in the new fuel pool, thus eliminating the possibility of draining the pool when spent fuel is being stored. The new fuel pool is provided with a sump to be used with a portable sump pump for drainage. Provisions are made to limit and detect leakage of the new fuel pool as discussed in Section 9.1.3. A description of the pool liner is given in Section 9.1.3.

The new fuel inspection pit is a concrete structure located in the north end of the Fuel Handling Building at elevation 261'. It has a concrete floor with no steel liner. It is not usable for wet storage, due to an open stairwell leading down to the 216' elevation, with a non-waterproof door into the pit. B|10

TABLE 9.1.1-1 WAS DELETED BY AMENDMENT NO. 43.

9.1.2 SPENT FUEL STORAGE

9.1.2.1 Design Bases

The maximum storage capacity of the three spent fuel pools is 3704 PWR Assemblies. The total storage capacity of both the new and spent fuel pools is 4184 PWR assemblies. Fuel is stored in a combination of 6x10, 6x8, 7x10, and 7x7 PWR rack modules designed for underwater removal and installation should rack rearrangements be desired. Rearrangement of the racks would have no effect on maximum stored fuel criticality. Module arrangement may vary based on changing fuel storage needs, provided structural analysis shows the proposed module arrangement to be acceptable.

In the event additional space is needed for the storage of spent fuel from other nuclear plants in the CP&L system the spent fuel pools are designed for the storage of both PWR and BWR fuel. The 7x7 PWR rack modules are interchangeable with 11x11 BWR rack modules as these racks cover the same floor area. The actual number and type of assemblies being stored will vary.

The fuel racks consist of individual vertical cells fastened together through top and bottom supporting grid structures to form integral modules. A neutron absorbing material is encapsulated into the stainless steel walls of each storage cell. The PWR rack modules have a center-to-center spacing of 10.5 in. between cells. The BWR rack modules have a center-to-center spacing of 6.25 in. between cells. These free-standing, self-supporting modules are sufficient to maintain a subcritical array of $K_{eff} \leq 0.95$ even in the event the fuel pools are flooded with unborated water. Table 9.1.2-1 shows the parameters for the SHNPP spent fuel racks.

The design of the spent fuel storage racks precludes fuel insertion in other than prescribed locations, thereby preventing any possibility of accidental criticality. A lead-in opening is provided for each PWR storage location, and the storage cells provide full length guidance for the fuel assembly. BWR storage locations do not have a lead-in since the lower nozzle design eliminates the need for lead-in. PWR fuel assemblies will not fit in a BWR spent fuel rack. Insertion of a BWR fuel assembly into a PWR spent fuel rack will result in a subcritical array of $K_{eff} \leq 0.95$.

9.1.2.2 Facilities Description

The spent fuel storage facility is located in the Fuel Handling Building as shown in Figures 1.2.2-55 through 1.2.2-59. The spent fuel is transferred from the Containment to the fuel transfer canal through the fuel transfer tube. The spent fuel bridge crane is used to transport the spent fuel to the spent fuel racks and later to the spent fuel cask. This procedure is carried out with the spent fuel assemblies totally submerged.

There are three spent fuel pools. These pools are interconnected by means of the main fuel transfer canal which runs the length of the Fuel Handling Building. These pools are normally isolated by means of removable gates.

Analysis of potential fuel damage due to this situation was performed by Westinghouse. This analysis showed that although the kinetic energy for the dropped handling tool is 35 percent greater than the kinetic energy for a combined fuel assembly and tool drop accident, that latter case is more limiting from a fuel rod damage potential. In previous accident analyses it was assumed the the dropped fuel assembly fractures a number of fuel rods in the impacted (stationary) assembly and subsequently falls over and ruptures the remaining rods in the dropped assembly. In the case of a dropped tool accident, it is postulated that the handling tool directly impacts a stationary fuel assembly which can cause fuel rods to be fractured in the impacted assembly. However, no additional fuel rods are fractured due to the tool fallover after impact.

The analytical procedure for assessing fuel damage is to conservatively assume that the total kinetic energy of the dropped assembly is converted to fuel clad impact fracture energy. The energy required to break a fuel rod in compression is estimated to be 90 ft. lbs. If the total kinetic energy for the dropped tool, 6677 ft. lbs., is absorbed by fracturing the fuel rod, a total of 74 fuel rods would be broken.

This value is substantially less than the number of fuel rods that could be potentially fractured by a dropped fuel assembly and subsequent fallover. Based on this analysis, it is concluded that the dropped tool accident is not limiting.

Following this analysis, the potential for damage to the fuel racks was analyzed. Five different locations on the top of a standard PWR poison rack assembly were analyzed for straight drop BPRA tool impact. 25

In addition, the effect of dropping the BPRA tool at an angle such that it ended up lengthwise on the top of the rack was analyzed. However, since the energy is applied to a larger number of cells during the inclined drop, the damage to an individual cell is not as great as that of a straight drop.

The different scenarios analyzed indicate that it may be possible for the cell to drop 1/2-inch to the base or deflect laterally as much as .459-inch. It is possible that the cells located in the drop zone may be damaged enough to obstruct the insertion or removal of fuel. However, in no case does the fuel rack grid structure fail nor is the poison material damaged. Thus, an increase in reactivity between adjacent cells is not considered likely. This is also supported by the fact that the soluble boron in the pool water counteracts any postulated reactivity increase.

Thus, it has been demonstrated that this situation would have no adverse safety impact on the SHNPP stored fuel.

All materials used in construction are compatible with the storage pool environment, and all surfaces that come into contact with the fuel assemblies are made of annealed austenitic steel. All the materials are corrosion resistant and will not contaminate the fuel assemblies or pool environment.

Shielding considerations are discussed in Section 12.3. Radiological conditions associated with the fuel handling accident are discussed in Section 15.7.

TABLE 9.1.2-1

SHEARON HARRIS SPENT FUEL RACK DIMENSIONS*

Fuel Type: W 17x17, W 15x15, Ex 17x17, Ex 15x15, GE 8x8, GE 7x7, and GE 8x8R

RACK ITEM	PWR	BWR
C-C SPACING	10.500	6.250
CELL I.D.	8.750	6.050
POISON CAVITY	0.090	0.060-0.080
POISON WIDTH	7.500	5.100
CELL GAP (NOMINAL)	1.330	---
POISON THICKNESS	0.075	0.045-0.075
WALL THICKNESS	0.075	0.075
WRAPPER THICKNESS	0.035	0.035
POISON (GM-B10/SQ.CM)	0.020	0.0103-0.015

* All Dimensions in Inches

9.1.3 FUEL POOL COOLING AND CLEANUP SYSTEM

9.1.3.1 Design Basis

The Fuel Handling Building (FHB) is split into two storage facilities. The storage facility on the north end of the FHB consists of two spent fuel pools. The storage facility on the south end of the FHB consists of a spent fuel pool and a new fuel pool. The design bases for the Fuel Pool Cooling and Cleanup System (FPCCS) are as follows:

a) Each of the two fuel storage facilities consists of two 100 percent cooling systems, and cleanup equipment to remove the particulate and dissolved fission and corrosion products resulting from the spent fuel.

b) Fuel can be transferred between the storage facilities, as shown on Figure 1.2.2-55.

c) The FPCCS is designed to maintain water quality in the fuel storage pools and remove residual heat from the spent fuel.

d) The cooling system serving one fuel storage facility has been designed to remove heat loads generated by the quantities of fuel stored in the pool as indicated in Tables 9.1.3-1A, 9.1.3-1B, and 9.1.3-1C. 25

The fuel pool loading schedule, heat loads, equilibrium temperatures, heat-up rates and equipment design data are presented in Tables 9.1.3-1A, 9.1.3-1B, 9.1.3-1C, and 9.1.3-2. 25

e) The maximum pool temperature with the maximum normal heat load occurring simultaneously with a loss of a single fuel pool cooling loop will be 137 F. The maximum pool temperature with maximum abnormal heat load is 142 F. See Table 9.1.3-2 for fuel pool equilibrium temperatures. The pool concrete design temperature is 150 F. 25

The determinations of the fuel pool heatup rates indicated in Table 9.1.3-2 were calculated using the following assumptions:

1) No credit for operation of the FPCCS.

2) No evaporative heat losses.

3) No heat absorption by concrete or liner.

4) No heat absorption by spent fuel racks or fuel in pool. 25

f) The cleanup loop pumps have the capacity to provide makeup water at a rate greater than the loss of water due to normal system leakage and evaporation.

g) Safe water level (and thus sufficient radiation shielding) is maintained in the new and spent fuel pools since the cooling connections are at the tops of the pools.

Piping in contact with fuel pool water is austenitic stainless steel. The piping is welded except where flanged connections are used at the pumps, heat exchangers and control valves to facilitate maintenance.

Control Room and local alarms are provided to alert the operator of high and low pool water level, and high temperature in the fuel pool. A low flow alarm, based on measured flow to the fuel pool, is provided to warn of interruption of cooling flow.

The Fuel Pool Cooling and Cleanup System is comprised of the following components. The component parameters are presented in Table 9.1.3-2.

a) Fuel Pool Heat Exchanger - Four fuel pool heat exchangers are provided, two per Fuel Pool Cooling and Cleanup System. The fuel pool heat exchangers are of the shell and straight tube type. Component cooling water supplied from the Component Cooling Water System (Section 9.2.2) circulates through the shell, while fuel pool water circulates through the tubes. The installation of two heat exchangers per FPCCS assures that the heat removal capacity of the cooling system is only partially lost if one heat exchanger fails or becomes inoperative.

b) Fuel Pool Cooling Pump - Four horizontal centrifugal pumps are installed, two per Fuel Pool Cooling and Cleanup System. The use of two pumps installed in separate lines assures that pumping capacity is only partially lost should one pump become inoperative. This also allows maintenance on one pump while the other is in operation.

c) Fuel Pool Demineralizer - Two demineralizers are installed, one for each Fuel Pool Cooling and Cleanup System. Each demineralizer is sized to pass five percent of the loop circulation flow to provide adequate purification of the fuel pool water and to maintain optical clarity in the pool.

d) Fuel Pool Demineralizer Filter and Fuel Pool and Refueling Water Purification Filter - Four filters are installed. Each FPCCS has one fuel pool demineralizer filter and one fuel pool and refueling water purification filter. The filters remove particulate matter from the fuel pool water.

e) Fuel Pool Cooling and Cleanup System Skimmers - Twenty-three skimmers are installed; five each for the two largest spent fuel pools, two for each fuel transfer canal, three each for the new fuel pool and the smallest spent 25
fuel pool, two for the main fuel transfer canal, and one for the cask loading pool. A fuel pool skimmer pump and filter are provided for surface skimming of the fuel pool water. Flow from the pump is routed through the skimmer filter and returned to the fuel pools.

f) Fuel Pool and Refueling Water Purification Pump - Four fuel pool and refueling water purification pumps are provided, two for each fuel storage facility. Each pump can take suction from and return fluid to the refueling water storage tank via the Safety Injection System, the transfer canal, the new and spent fuel pools, or the refueling cavity. Fluids from these systems are purified by the fuel pool demineralizer and filter. Each pump can also take suction from the demineralized water storage tank for line flushing.

9.1.3.3 Safety Evaluation. All fuel pools are cooled by two independent cooling loops, either of which can remove the decay heat loads generated by the quantities of fuel on Tables 9.1.3-1A, 9.1.3-1B, and 9.1.3-1C.

Table 9.1.3-1A represents a full core unload case with the three spent fuel pools and flooded new fuel pool filled to capacity. The heat loads were calculated using Branch Technical Position ASB 9-2 with an uncertainty factor K equal to 0.20 for cooling times (t_s) less than 10^3 seconds and 0.10 for t_s greater than 10^3 seconds.

The heat load calculated represents the highest reasonable heat load possible for any combination of off-site and on-site fuel. It is assumed here that fuel discharged from Unit 1 will remain in the Southend pools and that off-site fuel from H. B. Robinson Unit 2 and Brunswick Units 1 and 2 is shipped to Harris in order to maintain full core reserve capability at these other reactors. Heat load values are dependent on inputs such as assembly power, EFPD, and decay time. Therefore, there is no dependence on BWR fuel type and the current heat load calculations (Reference 9.1.3-1) is bounding for those BWR fuel assemblies with burnups not exceeding 45,000 MWd/MTU.

In the event of a single failure in one of these Spent Fuel Cooling Loops, the other loop will provide adequate cooling. The pool temperature with one Fuel Pool Cooling Loop in operation will be equal to or less than 137°F.

The maximum normal heat load which would exist in the spent fuel pools concurrent with a LOCA would be 18.8 MBTU/hr. The maximum abnormal heat load value of 44.4 MBTU/hr given in FSAR Table 9.1.3-1A is not used because a LOCA is not required to be considered concurrent with the abnormal condition (complete core unload).

The maximum abnormal heat load has been recalculated for the Southend pools for fuel discharged from Unit 1 with batch average burnups up to 55,000 MWd/MTU and for offsite fuel shipped to Harris. The offsite fuel stored at Harris at the time of the heat load calculation was modeled using actual burnups and decay times. All fuel scheduled to be shipped to Harris was assumed to have a batch average burnup of 45,000 MWd/MTU and a decay time of 2.5 years prior to shipment. The BWR fuel may be channeled or unchanneled. The analysis is documented in the Nuclear Fuel Section QA files as Design Activity 93-0003, file NF 2493.0003 (Reference 9.1.3-1). The maximum heat load for these conditions remains below the heat load presented in Table 9.1.3-2, therefore; the maximum pool temperatures presented remain bounding for batch average burnups of 55,000 MWd/MTU for Harris fuel and 45,000 MWd/MTU for offsite fuel.

With this load, the amount of CCW flow required to maintain the fuel pool temperature less than 150 F is less than 3500 gpm. One train of CCW has sufficient capacity to carry the heat loads from the applicable RHR pump (5 gpm) and RHR heat exchanger (5600 gpm). This leaves 3545 gpm available to

The skimmer system for the new and spent fuel pools consists of surface skimmers, a skimmer pump and filter. The surface skimmers float on the water surface and are connected via flexible hose to the pump suction piping at various locations on the perimeter of the pools. Flow from the pump is routed through the skimmer filter and returned to the fuel pools below the water level.

Syphoning of the pools is prevented by limiting the skimmer hose length to approximately five (5) feet. In addition the skimmer system return piping enters the pool at a point five (5) feet below the normal pool water level and terminates flush with the pool liner. Therefore, water loss due to failures in the skimmer system piping would be limited to five (5) feet.

A failure of the skimmer system piping would not uncover spent fuel nor interrupt fuel pool cooling since the fuel pool cooling water suction connections are located more than five (5) feet below the normal water level.

Draining or syphoning of the spent and new fuel pools via piping or hose connections to these pools or transfer canals is precluded by the location of the penetrations, limitations on hose length, and termination of piping penetrations flush with the liner. Hoses connected to temporary equipment used in the new and spent fuel pools are administratively controlled to prevent syphoning. The fuel pools cooling water return piping terminate at elevation 279 ft., 6 in. The spent fuel pool suction piping exists at 278 ft., 6 in. and the new fuel pool exits at 277 ft., 6 in.. Normal pool water level is 284 ft., 6 in, with the top of the spent fuel at approximately 260 ft. Skimmer suction piping exits the pools at elevation 285 ft., 3 in.

The reduction of the normal pool water level by approximately 5 ft. due to any postulated pipe failure will have no adverse impact on the capability of the cooling system to maintain the required temperature and it does not effect the required shield water depth for limiting exposures from the spent fuel. The slow heatup rate of the fuel pool would allow sufficient time to take any necessary action to provide adequate cooling using the backup provided while the cooling capability for the fuel pool is being restored.

Technical Specification 3.9.11 requires a minimum 23 feet of water over the top of irradiated fuel assemblies seated in the storage racks whenever irradiated fuel assemblies are in a pool. The ability of 23 feet of water to remove 99 percent of the assumed 10 percent iodine gas activity released during the postulated fuel accident forms the bases of this Technical Specification. Technical Specification 3.9.11 requires all movement of fuel assemblies and crane operations with loads in the affected pool area be suspended and the water level restored to within its limit within four hours if the water depth over the stored fuel assemblies falls below 23 feet. These actions would prevent a fuel handling accident with less than 23 feet of water over fuel assemblies stored in the spent fuel pools.

There are two alarms associated with low spent fuel pool water level. The first alarm occurs with approximately 24 feet of water over the stored fuel assemblies and provides the operators with sufficient warning and time to place all loads in a safe position prior to the water level decreasing to 23 feet.

The FPCCS undergoes preoperational and startup test as described in Section 14.2.12. Periodic tests are required as described in the Technical Specifications. Inservice inspection requirements are described in Section 6.6 and pump and valve testing will be performed as described in Section 3.9.6.

The spent fuel pool liners have a vacuum box test performed on the major liner field joints normally exposed to water prior to initial fill.

Components of the system are cleaned and inspected prior to installation. Demineralized water is used to flush the entire system. Instruments are calibrated and alarm functions checked for operability and setpoints during testing. The system will be operated and tested initially with regard to flow points, flow capacity and mechanical operability.

Data will be taken periodically during normal system operation to confirm heat transfer capabilities, purification efficiency, and differential pressures across components.

TABLE 9.1.3-1A

MAXIMUM ABNORMAL HEAT LOAD - ALL FUEL POOLS 25

Cooling Time (Days)	Operating Time (Days)	Source	No. of Assemblies	Fuel Type	Core Operating Power (Mwt)	Heat Load BTU/hr
11315	985	HBR	52	PWR	2300	114712
10950	985	HBR	52	PWR	2300	117520
10585	985	HBR	53	PWR	2300	122695
10585	1230	BSEP	360	BWR	2436	270144
10220	985	HBR	52	PWR	2300	123292
9855	985	HBR	52	PWR	2300	126256
9855	1230	BSEP	360	BWR	2436	283392
9490	985	HBR	53	PWR	2300	131811
9490	930	SHNPP	52	PWR	2900	159640
9125	985	HBR	52	PWR	2300	132444
9125	930	SHNPP	52	PWR	2900	163488
9125	1230	BSEP	360	BWR	2436	297288
8760	985	HBR	52	PWR	2300	135668
8760	930	SHNPP	53	PWR	2900	170660
8395	985	HBR	53	PWR	2300	141616
8395	930	SHNPP	52	PWR	2900	171496
8395	1230	BSEP	360	BWR	2436	311832
8030	985	HBR	52	PWR	2300	142272
8030	930	SHNPP	52	PWR	2900	175656
7665	985	HBR	52	PWR	2300	145756
7665	930	SHNPP	53	PWR	2900	183380
7665	1230	BSEP	360	BWR	2436	327132
7300	985	HBR	53	PWR	2300	152163
7300	930	SHNPP	52	PWR	2900	184288
6935	985	HBR	52	PWR	2300	152880
6935	930	SHNPP	52	PWR	2900	188708
6935	1230	BSEP	360	BWR	2436	343152
6570	985	HBR	52	PWR	2300	156572
6570	930	SHNPP	53	PWR	2900	197001
6205	985	HBR	53	PWR	2300	163452
6205	930	SHNPP	52	PWR	2900	197964
6205	1230	BSEP	360	BWR	2436	359964
5840	985	HBR	52	PWR	2300	164268
5840	930	SHNPP	52	PWR	2900	202748
5475	985	HBR	52	PWR	2300	168220
5475	930	SHNPP	53	PWR	2900	211682
5475	1230	BSEP	360	BWR	2436	377640
5110	985	HBR	53	PWR	2300	175642
5110	930	SHNPP	52	PWR	2900	212732
4745	985	HBR	52	PWR	2300	176488
4745	930	SHNPP	52	PWR	2900	217880
4745	1230	BSEP	360	BWR	2436	396000
4380	985	HBR	52	PWR	2300	180752

TABLE 9.1.3-1A (cont'd)

25

MAXIMUM ABNORMAL HEAT LOAD - ALL FUEL POOLS

Cooling Time (Days)	Operating Time (Days)	Source	No. of Assemblies	Fuel Type	Core Operating Power (Mwt)	Heat Load BTU/hr
4380	930	SHNPP	53	PWR	2900	227423
4015	985	HBR	4	PWR	2300	14244
4015	930	SHNPP	52	PWR	2900	228592
4015	1230	BSEP	360	BWR	2436	415440
3650	930	SHNPP	52	PWR	2900	234208
3285	930	SHNPP	53	PWR	2900	244648
3285	1230	BSEP	360	BWR	2436	436320
2920	930	SHNPP	52	PWR	2900	246376
2920	1230	BSEP	33	BWR	2436	44784
2555	930	SHNPP	52	PWR	2900	253552
2190	930	SHNPP	53	PWR	2900	267915
1825	930	SHNPP	52	PWR	2900	277264
1460	930	SHNPP	52	PWR	2900	304356
1095	930	SHNPP	53	PWR	2900	370788
730	930	SHNPP	52	PWR	2900	508768
365	930	SHNPP	52	PWR	2900	968760
5.8	930	SHNPP	53	PWR	2900	10737800
5.8	620	SHNPP	52	PWR	2900	10332400
5.8	310	SHNPP	52	PWR	2900	9796800
					TOTAL	4.44E+07

TABLE 9.1.3-1B

MAXIMUM NORMAL HEAT LOAD - ALL FUEL POOLS | 25

Cooling Time (Days)	Operating Time (Days)	Source	No. of Assemblies	Fuel Type	Core Operating Power (Mwt)	Heat Load BTU/hr
11315	985	HBR	52	PWR	2300	114712
10950	985	HBR	52	PWR	2300	117520
10585	985	HBR	53	PWR	2300	122695
10585	1230	BSEP	360	BWR	2436	270144
10220	985	HBR	52	PWR	2300	123292
9855	985	HBR	52	PWR	2300	126256
9855	1230	BSEP	360	BWR	2436	283392
9490	985	HBR	53	PWR	2300	131811
9490	930	SHNPP	52	PWR	2900	159640
9125	985	HBR	52	PWR	2300	132444
9125	930	SHNPP	52	PWR	2900	163488
9125	1230	BSEP	360	BWR	2436	297288
8760	985	HBR	52	PWR	2300	135668
8760	930	SHNPP	53	PWR	2900	170660
8395	985	HBR	53	PWR	2300	141616
8395	930	SHNPP	52	PWR	2900	171496
8395	1230	BSEP	360	BWR	2436	311832
8030	985	HBR	52	PWR	2300	142272
8030	930	SHNPP	52	PWR	2900	175656
7665	985	HBR	52	PWR	2300	145756
7665	930	SHNPP	53	PWR	2900	183380
7665	1230	BSEP	360	BWR	2436	327132
7300	985	HBR	53	PWR	2300	152163
7300	930	SHNPP	52	PWR	2900	184288
6935	985	HBR	52	PWR	2300	152880
6935	930	SHNPP	52	PWR	2900	188708
6935	1230	BSEP	360	BWR	2436	343152
6570	985	HBR	52	PWR	2300	156572
6570	930	SHNPP	53	PWR	2900	197001
6205	985	HBR	53	PWR	2300	163452
6205	930	SHNPP	52	PWR	2900	197964
6205	1230	BSEP	360	BWR	2436	359964
5840	985	HBR	52	PWR	2300	164268
5840	930	SHNPP	52	PWR	2900	202748
5475	985	HBR	52	PWR	2300	168220
5475	930	SHNPP	53	PWR	2900	211682
5475	1230	BSEP	360	BWR	2436	377640
5110	985	HBR	53	PWR	2300	175642
5110	930	SHNPP	52	PWR	2900	212732
4745	985	HBR	52	PWR	2300	176488
4745	930	SHNPP	52	PWR	2900	217880
4745	1230	BSEP	360	BWR	2436	396000
4380	985	HBR	52	PWR	2300	180752

TABLE 9.1.3-1B (cont'd)

MAXIMUM NORMAL HEAT LOAD - ALL FUEL POOLS 25

Cooling Time (Days)	Operating Time (Days)	Source	No. of Assemblies	Fuel Type	Core Operating Power (Mwt)	Heat Load BTU/hr
4380	930	SHNPP	53	PWR	2900	227423
4015	985	HBR	4	PWR	2300	14244
4015	930	SHNPP	52	PWR	2900	228592
4015	1230	BSEP	360	BWR	2436	415440
3650	930	SHNPP	52	PWR	2900	234208
3285	930	SHNPP	53	PWR	2900	244648
3285	1230	BSEP	360	BWR	2436	436320
2920	930	SHNPP	52	PWR	2900	246376
2920	1230	BSEP	33	BWR	2436	44784
2555	930	SHNPP	52	PWR	2900	253552
2190	930	SHNPP	53	PWR	2900	267915
1825	930	SHNPP	52	PWR	2900	277264
1460	930	SHNPP	52	PWR	2900	304356
1095	930	SHNPP	53	PWR	2900	370788
730	930	SHNPP	52	PWR	2900	508768
365	930	SHNPP	52	PWR	2900	968760
32	930	SHNPP	53	PWR	2900	5200000
					TOTAL	1.88E+07

25

TABLE 9.1.3-1C

MAXIMUM NORMAL/ABNORMAL HEAT LOAD - NORTH END POOLS 25

Cooling Time (Days)	Operating Time (Days)	Source	No. of Assemblies	Fuel Type	Core Operating Power (Mwt)	Heat Load BTU/hr
11315	985	HBR	52	PWR	2300	114712
10950	985	HBR	52	PWR	2300	117520
10585	985	HBR	53	PWR	2300	122695
10585	1230	BSEP	360	BWR	2436	270144
10220	985	HBR	52	PWR	2300	123292
9855	985	HBR	52	PWR	2300	126256
9855	1230	BSEP	360	BWR	2436	283392
9490	985	HBR	53	PWR	2300	131811
9125	985	HBR	52	PWR	2300	132444
9125	1230	BSEP	360	BWR	2436	297288
8760	985	HBR	52	PWR	2300	135668
8395	985	HBR	53	PWR	2300	141616
8395	1230	BSEP	360	BWR	2436	311832
8030	985	HBR	52	PWR	2300	142272
7665	985	HBR	52	PWR	2300	145756
7665	1230	BSEP	360	BWR	2436	327132
7300	985	HBR	53	PWR	2300	152163
6935	985	HBR	52	PWR	2300	152880
6935	1230	BSEP	360	BWR	2436	343152
6570	985	HBR	52	PWR	2300	156572
6205	985	HBR	53	PWR	2300	163452
6205	1230	BSEP	360	BWR	2436	359964
5840	985	HBR	52	PWR	2300	164268
5475	985	HBR	52	PWR	2300	168220
5475	1230	BSEP	360	BWR	2436	377640
5110	985	HBR	53	PWR	2300	175642
4745	985	HBR	52	PWR	2300	176488
4745	1230	BSEP	24	BWR	2436	26400
4380	985	HBR	22	PWR	2300	76472
					TOTAL	5.42E+06

TABLE 9.1.3-2

FUEL POOL COOLING AND CLEANUP SYSTEM PARAMETERS

	South End	North End	
Fuel Pool Heat Loads			
Maximum abnormal (based on fuel distribution shown in Tables 9.1.3-1A & 1C) Btu/hr	39.02×10^6	5.417×10^6	27
Maximum normal (based on fuel distribution shown in Tables 9.1.3-1B & 1C) Btu/hr	13.35×10^6	5.417×10^6	
Fuel Pool Equilibrium Temperature			
Maximum abnormal load, one cooling loop operating each FPCCS, °F	142	110	
Maximum normal load, one cooling loop operating both FPCCS, °F	137	126	
Combined Spent and New Fuel Pool Water Heat Inertia, No Heat Removal			
Maximum abnormal load, rate of temperature increase, °F/hr	12.9	1.7	
Maximum normal load, rate of temperature increase, °F/hr	4.4	1.7	
Fuel Pool Heat Exchanger			
Quantity (per FPCCS)	2		
Type	Shell and Two Pass Straight Tube		
UA (Design per Heat Exchanger), Btu/hr.-F	21.1×10^5		27
Shell Side (Component Cooling Water) - Design			
Inlet temperature, F	105		
Outlet temperature, F	110		
Flowrate, lb./hr.	2.68×10^6		
Design pressure, psig	150		
Design temperature, F	200		
Material	Carbon Steel		
Tube Side (Fuel Pool Water) - Design			27
Inlet temperature, F	120		
Outlet temperature, F	113		
Flowrate, lb./hr.	2.256×10^6		
Design pressure, psig	150		
Design temperature, F	200		
Material	Stainless Steel		

TABLE 9.1.3-2 (Continued)

Fuel Pool Cooling Pump	
Quantity (per FPCCS)	2
Type	Horizontal Centrifugal
Design flowrate, gpm	4560
TDH, ft. H2O	98
Motor horsepower	150
Design pressure, psig	150
Design temperature, °F	200
Material	Stainless Steel

Spent Fuel Pools	Pool 1	Pool 2	Pool 3
Volume gals.	403,920	403,920	191,480
Boron concentration, ppm (minimum)*	2,000	2,000	2,000
Liner material	Stainless Steel	Stainless Steel	Stainless Steel

New Fuel Pool	
Volume, gals.	147,804
Boron concentration, ppm (minimum)*	2,000
Liner material	Stainless Steel
Fuel Pool Demineralizer Filter	
Quantity (per FPCCS)	1
Type	Flushable
Design pressure, psig	400
Design temperature, °F	200
Flow, gpm	325
Maximum differential pressure across filter element at rated flow (clean filter), psi	5
Maximum differential pressure across filter element prior to backflush, psi	60

*The actual boron concentration will be determined by the plants' Technical Specifications for Refueling.

TABLE 9.1.3-2 (Continued)

FUEL POOL COOLING AND CLEANUP SYSTEM PARAMETERS

Fuel Pool Demineralizer	
Quantity (per FPCCS)	1
Type	Flushable
Design pressure, psig	400
Design temperature, F	200
Design flowrate, gpm	325
Volume of resin (each), ft^3	85
Fuel Pool and Refueling Water Purification Filter	
Quantity (per FPCCS)	1
Type	Flushable
Design pressure, psig	400
Design temperature, F	200
Flow, gpm	325
Maximum differential pressure across filter element at rated flow (clean filter), psi	5
Maximum differential pressure across filter element prior to backflush, psi	60
Fuel Pool Strainer	
Quantity (per FPCCS)	1
Type	Basket
Flowrate, gpm	4560 (40)
Design pressure, psig	150
Design temperature, F	200
Maximum differential pressure across the strainer element at above flow (clean), psi	1.4
Mesh	40
Fuel Pool Skimmer Pump Suction Strainer	
Quantity (per FPCCS)	1
Type	Duplex Basket
Design pressure, psig	150
Design temperature, F	200
Flowrate, gpm	385

TABLE 9.1.3-2 (Continued)

FUEL POOL COOLING AND CLEANUP SYSTEM PARAMETERS

Fuel Pool Skimmer Pump Suction Strainer (Continued)		
Maximum differential pressure across filter element at rated flow (clean), psi	5	
Maximum differential pressure across filter element prior to removing, psi	60	
Mesh	100	
Fuel Pool Skimmer Filter		
Quantity (per FPCCS)	1	15
Type	Flushable	
Design pressure, psig	400	
Design temperature, F	200	
Flowrate, gpm	400	
Maximum differential pressure across filter element at rated flow (clean), psi	5	
Maximum differential pressure across filter element prior to removing, psi	60	
Fuel Pool Skimmer Pump		
Quantity (per FPCCS)	1	15
Flowrate, gpm	385	
TDH, ft. H20	210	
Motor horsepower	40	
Design pressure, psig	150	
Design temperature, F	200	
Material	Stainless Steel	
Fuel Pool and Refueling Water Purification Pump		
Quantity (per FPCCS)	2	
Type	Vertical In-line Centrifugal	
Design flowrate, gpm	325	
TDH, ft. H20	320	
Motor horsepower	60	
Design pressure, psig	150	
Design temperature, F	200	
Material	Stainless Steel	

TABLE 9.1.3-2 (Continued)

FUEL POOL COOLING AND CLEANUP SYSTEM PARAMETERS

Fuel Pool Cooling and Cleanup System Piping and Valves			
Material	Stainless Steel		
Design pressure, psig	150		
Design temperature, F	200		
Fuel Pool Skimmers	Quantity	gpm each	
Large Spent Fuel Pool (per FPCCS)	5	35	
Small Spent Fuel Pool	3	30	25
New Fuel Pool	3	30	
Fuel Transfer Canal (per FPCCS)	2	25	
Main Fuel Transfer Canal (per FPCCS)	1	20	
Cask Loading Pool	1	50	25

Table 9.1.3-3 Deleted by Amendment No. 43